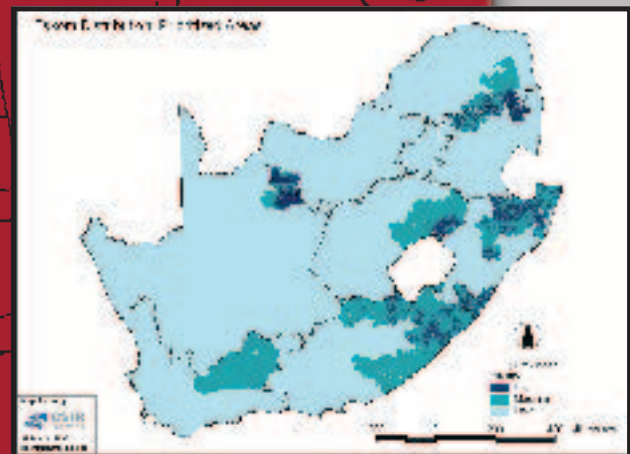




Operations Research Society of South Africa
Operasionele Navorsingsvereniging van Suid-Afrika

Newsletter

Time Clocks: Hijacking incidents over a one year period given in 2 hour time slots



THE USE OF GIS IN DECISION SUPPORT

March 2004

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FROM THE PRESIDENT'S DESK

By Wim Gevers (wg@sun.ac.za)

ORSSA President



The year 2004 is well under way and I trust that every reader of the newsletter is making good progress with those New Year's resolutions that they have made, or in a softer vein, targets that they have set for themselves. Naturally the society has similar challenges.

During the annual conference in September 2003, we decided that the society's executive urgently needed to get together for a strategy session in order to provide direction for the executive and the society as a whole. After consultation between the members of the executive we decided that it would be best if we could meet face to face and be guided by an external facilitator. This we did for a full Saturday at the end of January in Cape Town and were ably guided through the process by Prof Hein Oosthuizen, Professor of Strategy at the Graduate School of Business, University of Stellenbosch. A very high proportion of the executive attended, indicating to the society's membership the commitment of the current executive to serve the society!

Wim Gevers

For some members of the executive a strategy session was a new experience, whereas others were well versed in the methodologies used – in fact a number of executive members are used to run strategy sessions. We decided to use an external facilitator for the sessions primarily to allow all executive members to participate fully and hopefully it would be possible to extract information that would not have been extracted had the session been run by a member of the society. In the end we all agreed that the mere fact that we were able to get together to talk about issues affecting the society as whole in a focussed session without having to deal with regular issues on the executive's agenda, was very fruitful. In fact a desire was expressed that this should be done more regularly.

In the remainder of this note I want to highlight a number of issues that surfaced during the strategy session, in order for these matters to be placed in the domain of open discussion. The executive is there to serve the members of the society, hence members should know what the executive is doing, and I invite you to comment on these matters.

We started off by looking at the vision of the society. We worked in two subgroups and both groups came up with remarkably similar visions for the society – that what we want to be. I have constructed a combination of the work of the two groups, and according to that our vision is defined as:

ORSSA is a natural professional home to all persons who are involved in a systematic way of decision support, for the maintenance and advancement of all areas of Operations Research and the creation of opportunities for shared learning and networking amongst all members.

Naturally this vision can be expanded and elaborated upon, but the vision was but the start of the strategy session and we needed to discuss many more issues. Most members can hopefully identify with this vision.

In discussing the purpose of ORSSA, we looked at whom we are serving (who are our “customers”), what the needs of these

customers are (perceived and real) and how we can address these needs. From our discussions it became quite clear that the society serves primarily individuals – in fact, it was stated that corporate membership turns around individuals within organisations and that corporate membership per se is a myth. Hence our focus should be on the individual – but even here it is essential to classify the individuals into different needs-groups. Over and above the practitioners of OR and the OR academics we have a fair group of student members or young graduate members who have different needs to those established in the OR fraternity. In addition there is also a grouping of members (and ex-members) who used to be practitioners of OR but who have progressed in their organisations so that they are no longer actively involved in the practice of OR.

The younger generation are primarily looking towards the society to create avenues that could lead to employment opportunities – temporary and full-time positions. For the more seasoned members networking is probably highest on the priority list. These two goals are not irreconcilable – if we would get a higher activity rates within the chapters where both student members and practitioners meet and share ideas, this could well lead to the desired employment – something that the Western Cape Chapter can attest to. Single successes are pleasing, but this still has to become the norm.

Naturally in our discussions we also looked at what the society is already doing and the success that we have with this. The list of activities is, in fact, quite extensive (annual conference, peer-reviewed journal, newsletter, chapter activities, prizes for members and student research, website and international activities through EURO and IFORS), but is it delivering the value that members are wanting?

As a result we have decided that we shall contact the membership as well as the previous members to fathom what they really want from the society. At the same time we shall start looking at what other societies are doing to establish where we can work together towards achieving mutual goals.

We are also well under the impression that nothing sells success like success. As a result it is essential that we get to hear much, much more about the success stories of OR. And that is where you as the member can play a role. Have you been involved with an interesting decision support exercise of late? Do let us hear – the newsletter editor is yearning to publish the success stories. You do not have to write a scientific article about what you have done – a narrative will be far more interesting for the general reader!

We will also be looking at how we can develop more active chapters. In this regards there is a concern that the social capital in society is diminishing – the things that we do voluntarily for the benefit of society at large. A society and its chapters can only be as active as its collective membership. In this regards it is appropriate to change JF Kennedy's famous quote about patriotism and challenge you as members of the society: Ask not what your society can do for you, but what you can do for your society!

As we role out some of the envisaged activities, we look forward to your participation to make the society the vibrant and exciting entity that it can be! I encourage you to communicate with me at wg@sun.ac.za, or with any member of the executive that you know. ♦

ORSSA Executive 2004



Back: Hans Ittmann, Wim Gevers, Marthi Harmse, Stephan Visagie, Esbeth van Dyk, Theo Stewart, Trinette Evert, Gys Wessels
Front: Theo Stylianides, Leo Tomé
Absent: Jan van Vuuren, Isabelle Nieuwoudt, Dave Evans, Stephan Beneke

FROM THE EDITOR



Leo Tomé
 challenges and help build this miracle we call South Africa.

I have just finished reading the Budget speech for 2004. In it the goals that were set for the RDP are discussed; as well as the economic outlook for the next ten years. While reading the document I was constantly aware of the huge challenge faced by all of us. Furthermore I am tremendously excited by the immense possibilities for OR and for us, as OR practitioners, to contribute to the

In our main article for this issue, *The use of GIS in decision support*, there are two excellent examples of how OR can positively contribute to the challenges faced during the second decade of democracy. The first goal of the RDP, mentioned in the speech is *to meet the basic needs of all South Africans*. The second goal is *democratising the state and society*, with rule of law being seen as one of the key elements in this goal. The article contains two case studies with one on *Determining priority areas for Eskoms's distribution expansion* and the other one on OR in crime prevention.

Very appropriately ORSSA is also in the process of strategic planning for determining the way ahead for the society as to best serve the members, as well as the discipline of operations research. In this issue tribute is brought to Dr. A.P. Burger, who recently passed away. He played a major role in establishing OR in South Africa. Hopefully ORSSA will be able to further this work and ensure that the discipline comes to its true right during the second decade of democracy.

Until next time,
 Leo Tomé

HULDEBLYK AAN DR. A.P. BURGER

Deur Gerhard Geldenhuys



Dr. Alewyn P. Burger is op 10 Desember 2003 in Pretoria oorlede. Hy was 76 jaar oud. Hy was internasionaal bekend vir sy werk in weerkunde en het tot 'n maand voor sy dood nog een dag per week navorsing by die WNNR gedoen. Hy was 'n ontvanger van die Havenga-prys van die Suid-Afrikaanse

Dr.A.P. Burger Akademie vir Wetenskap en Kuns vir sy navorsing en was in 1979 en 1980 'n ere-professor in Toegepaste Wiskunde by die Universiteit van Stellenbosch. Hy was van 1973 tot 1976 'n vise-president van die WNNR en is in 1977 aangestel as die Wetenskaplike Raadgewer van die Eerste Minister van Suid-Afrika.

Dr. Burger het agter die skerms 'n baie belangrike rol in die vroeë dae van ON in Suid-Afrika gespeel. Die Nasionale Navorsingsinstituut vir die Wiskundige Wetenskappe (NNWW) het in 1961 by die WNNR tot stand gekom met dr. Burger as die eerste Direkteur, 'n pos wat hy tot in 1973 beklee het. Een van die eerste groot take van die NNWW was 'n besonder groot projek vir die Suid-Afrikaanse Mielieraad oor die distribusie van mielies in die land, wat beskou kan word as 'n transport probleem in lineêre programmering met die komplikasie dat dit ook uitspraak moes gee oor die ekonomiese volhoubaarheid van meulens. Dr. Burger het in hierdie tyd die inisiatief geneem om 'n opname te laat maak van die moontlike toepassings wat ON in Suid-Afrika sou kon vind en om te reël dat 'n reeks lesings oor ON vir die personeel van die NNWW aangebied word. Onder die persone wat die lesings bygewoon het, was persone soos dr. Gerhard J. Rudolph, dr. C.G. (Cas) Troskie, dr. N.F. (Nico) Laubscher, Gideon de V. de Kock, A.P. Louw Kotzé en J.W. (Jos) Grobbelaar, die meeste van hulle persone wat later belangrike rolle in die vroeë dae van ON in Suid-Afrika sou speel.

Op grond van die opname oor die toepassingsmoontlikhede van ON het dr. Burger voortgegaan om (met die ondersteuning van Laubscher, Rudolph en Troskie) ON as 'n dissipline binne die NNWW te vestig en personeellede aan te wys en aan te stel om in hierdie rigting te werk. Later is 'n aparte afdeling vir Operasionele Navorsing en Statistiek binne die NNWW gevestig. Sommige van hierdie personeellede is in 1964 deur dr. Burger oorsig gestuur vir nagraadse opleiding in ON. Dit sluit in mense soos Gerhard Rudolph (Engeland en die VSA), Jos Grobbelaar en Louw Kotze (Engeland).

Die rol wat die NNWW in die vroeë dae van ON in Suid-Afrika gespeel het, en die positiewe effek van die ondersteuning wat dr. Burger aan ON gegee het, kan beswaarlik oorskakel word. Aan die een kant was die NNWW op die voorpunt van interessante toepassingsgebiede vir ON. Aan die ander kant is daar uit die geleedere van die NNWW aanstellings by verskillende Suid-Afrikaanse universiteite en nywerhede gemaak waardeur ON in die 1960's as 'n akademiese vak en as 'n toepaslike dissipline bevorder is. Onder andere is Unisa, die Universiteite van Kaapstad, Stellenbosch en Rhodes sowel as Yskor en die Poskantoor op hierdie wyse bevoordeel. Dit is dus gepas dat ONSA hulde bring aan die visie wat dr. Burger oor ON gehad het, die hoë standarde wat hy deurgaans gestel het en die groot bydraes wat hy gemaak het om ON te bevorder. Ons eer sy nagedagtenis. ♦

MEMBER PROFILE: DAVE EVANS

By Leo Tomé (ldtome@dip.sun.ac.za)



Dave Evans

Dave Evans is currently employed as a senior strategic planner with the Development Bank of Southern Africa. Prior to this he has had an long and illustrious career in the private sector. Dave was born in the UK, and after completing his MSc at Imperial College London and starting work at ICI he moved to South Africa in 1971. From 1971 up to 1997 Dave held a whole range of positions at AECI, including Information Services Manager, Logistics Manager, and IT Manager.

Dave has also served the society well over the years. Serving as national President and vice-president, member of national executive committee, as well as chairman, secretary and treasurer of the Johannesburg Chapter at different times. He has also been newsletter Editor, adjudicator/referee for papers for ORiON (guest editor for a 1998 edition), organiser of the 1985 National Conference, Chairman of the Organising Committee for an international conference in 1987 and of the organising committee for the 1995 national conference. Currently he serves as chairman of the Johannesburg Chapter, and a member of the national executive committee.

Question: When and why did you first become involved in OR and ORSSA?

Answer: I was finishing a Biochemistry degree in the UK in 1968, and feeling that wasn't where I wanted to spend the rest of my working life. I tripped over an article on OR in a careers guidance brochure (the kind of thing that we put into the same brochures that still circulate schools and universities to this day.) That led me to apply for and get accepted onto an MSc course of "OR and Management Studies" at Imperial College London. I was offered a job doing OR by ICI, (a global chemicals company) which I took up when I finished the MSc. From ICI I transferred to AECI (which was a subsidiary of ICI in those days) in Johannesburg in 1971, and joined ORSSA when I came back from a spell in Zimbabwe, in 1979.

Question: You are originally from Britain. How did you come to stay in South Africa and what has kept you here through all of these years?

Answer: Half of the answer is above; I really came here "for a couple of years", but settled, got married, enjoyed the country, the life, the work, and 33 years later...

Question: What would you consider to be the highlight of your career in operations research?

Answer: Difficult – there have been many. Effectively writing

spreadsheet software in Fortran on a mainframe in the early 70s and then using it to model various ways of totally restructuring the pricing mechanisms of the whole southern African explosives market will have to be one. Our clients were the AECI main board. Using linear programming models to totally revamp the way that AECI ran its chlor-alkalis and fertiliser businesses would be another. Running a team of a dozen OR specialists to expand those kind of services into a broader strategic management of AECI would also qualify. Organising a variety of successful conferences for ORSSA, one of which was a regional "OR in Resource Management" also come in, as does my year as National President. Being invited to be keynote speaker at the ORSSA conference at Golden Gate a few years ago is up there as well.

Question: ORSSA is currently in a process of strategically repositioning itself to help see OR in SA into the future. What do you see as the challenges to be addressed and what role do you see OR playing in the future in SA?

Answer: I feel the biggest opportunity for us is in the public sector. The needs are enormous, and the impact which we should be having there equally so – we can make a huge difference fairly easily, by combining the tried and tested "hard" OR with the newer, soft stuff such as MCDM, soft systems approaches and change management skills. We also need to market OR much more, so that potential future practitioners (school children, university students) know it exists as a career, and all our potential clients (particularly the public sector) know what we can do for them, and why they should use OR.

Question: Do you have a message for young aspiring OR practitioners?

Answer: OR has a huge potential for making enormously important changes in Africa. We won't do that by sitting in universities, academically assessing whether we can make a Simplex routine run 0.5% faster, or which of the following 17 statistical distributions really fits the AIDS epidemic data best. OR in Africa is going to have to be a fairly dirty discipline for a while, (I could argue good OR always has been?) getting out there and making quick, 25% differences to solutions where they are currently running at about 50% - not spending years trying to decide whether we can get them up to 57% or 58%. If we do that for the next few years, we will be the most highly thought of, and highly sought profession, on the continent – that strikes me as a good thing to shoot for! ♦

DISCLAIMER

The views expressed in this newsletter are those of the contributors, and not necessarily those of the Operations Research Society of South Africa. The Society is not responsible for the accuracy of details concerning conferences, advertisements, etc., appearing in this newsletter. Members should verify those aspects themselves if they intend to respond to them.



TOM ROZWADOWSKI MEDAL 2003

By Hans Ittmann (hittmann@csir.co.za)



Renier Fossati

At the ORSSA Conference in September 2003 the Tom Rozwadowski medal was awarded to Dr. Reiner Fossati and Prof. Kobus Wolvaardt for their paper: "The construction of drape surfaces with constrained first derivatives." The paper describes a problem that arises in airborne geophysical surveys where it is necessary to fly a safe distance above the ground and within the performance limitations of the aircraft used, but at the same time as close as possible to the ground surface. The problem was addressed by formulating it as an LP with constraints at every point of a grid covering the area concerned.

The actual presentation of the award was, to put it mildly, a "total disaster." Both recipients were not present at the opening session of the conference where the awards are typically made. Nobody whispered in their ears that they should be there! Kobus Wolvaardt disappeared (how could you have done that Professor!) just before the start of proceedings to apparently make a correction to his presentation later that day! Reiner Fossati was not there because he was not aware of this at all. After the medal was presented to Kobus at the AGM, to my personal huge embarrassment, I never checked that Reiner is a member of ORSSA, I just assumed he was not! So even bigger was my embarrassment when I got an e-mail from him to enquire about him getting something tangible to show that he, in fact, did get the award! To make matters worse, we don't keep medals in stock so I then had to explain that although he is a recipient of the award, I first need to order a medal, get it engraved with his name and the date before the award can be finally presented to him. All of this took some time also because of me being busy with all kinds of things and not getting everything done promptly. In the end I met Reiner at the Protea Hotel in Midrand in the first half of December where I presented him with the medal. It was not a fancy affair; we only had coffee between the two of us. Nevertheless, Reiner and Kobus are worthy winners of this award. So in the end things worked out fine. Arranging to meet with Reiner I had to laugh - in describing himself to me, since we had never met before, he said he is an "old toppie." When I then met Reiner, it turns out that I'm possibly ten years older than him. I must be a really old man then!

To get to know Reiner better, here is a shortened version of his CV.

Reiner Fossati was born and schooled in Cape Town and began his academic career with a degree in Chemical Engineering from the University of Stellenbosch. After compulsory military service this knowledge was applied in the defence of the country, specifically in the design of warheads. Much exposure to computing machinery caused him to change course from a pure engineering field to one in which he was able to add a very thorough understanding of software and hardware to his basket of knowledge.

Reiner spent quite a few years with various suppliers of computer hardware and software, eventually specialising in fixing the machines that no-one else could repair and cracking the codes which were not supposed to be cracked.

After gathering much experience in a very varied assortment of fields, including finite element analysis, draughting software, operating system internals, object oriented languages and so on, his continuing studies (which included a BA in Linguistics and Statistics and an HonsBSc in Operations Research) led to the attainment of an MSc (with distinction) at Unisa in Operations Research on the fascinating subject of Steiner trees.

Eventually he decided to join the employ of a geophysical exploration company in 1992. The contact with airborne geophysical surveying planted the seed for his thesis about drape surfaces; in 2003 Unisa awarded him a PhD in Operations Research on this subject. In his current position Reiner is responsible for all real-time software within the company (which has achieved global status in the meantime), as well as providing the necessary advice to allow the company's processing methods to develop in order to become one of the foremost geophysical data processing facilities in the world.

Reiner spends his free time pursuing his interests in music (which includes singing in the Johannesburg Bach Choir) and literature (serious fiction preferred).

What remains of him is that he is married and has two daughters.

Congratulations again and although things took some time, both recipients now have their TR medals! ♦



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THE USE OF GIS IN DECISION SUPPORT



Peter Schmitz



Theo Stylianides

By

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and

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Centre for Logistics and Decision Support, CSIR

This article describes two examples, from crime prevention and utility planning, where a Geographical Information System (GIS) is used in conjunction with analytical techniques in decision support.

CRIME CLOCKS AND TARGET PERFORMANCE MAPS

Introduction

The CSIR has been assisting the South African Police Service (SAPS) in projects involving the operational analysis of crime information for the prevention and management of crime. The first part of the article describes crime mapping using two innovative techniques: *crime clocks* and *target performance maps*.

Sociologists and criminologists have been carrying out spatially orientated studies of crime and delinquency since 1830. A survey of crime mapping conducted in 1998 showed that as little as 13% of the policing agencies in the United States used computerised crime mapping. Crime mapping ranges from simply converting pins on paper maps into digital maps; to tracking offenders' movements with a combination of cell phone mapping and other techniques; to using historical data to create high potential recovery maps and even locating serial offenders. This can be done at a multi-scale level, utilising GIS, the power behind crime mapping.

There are several ways of mapping crime. Here follows a discussion of some pioneering techniques developed locally.

Crime clocks

The analysis of the distribution of crime in time and space is important for effective policing. *Crime clocks* display exactly that, using scaled pie charts to show the relative crime statistic for the selected period being analysed. Each pie chart shows the total aggregated crime for an area (e.g. Crime Administration System (CAS) Block or precinct). It is positioned on the centroid of the relevant area or CAS block. The size of each pie chart is proportional to the number of crime incidents that occurred in that area over the period of analysis. Each segment of a pie chart represents a selected part of the day (e.g. a two- or three-hour period) or a day of the week. The first and last segments in the day or week are then adjacent, ensuring that there is no artificial break at the end of

the day or week. That is, the time of day crime clocks, known as Cooper-Potgieter-Schmitz (CPS) clocks, start and end at midnight. Similarly, the week clocks start on Monday and end on Sunday elsewhere.

The first example is of a CPS or time-of-day crime clock, the second is that of a day-of-week crime clock. Figure 1 illustrates time-of-day crime (CPS) clocks for theft of motor vehicles in central Johannesburg. A year's data has been utilised and each clock consists of two-hour segments, with midnight at the top of the clock. It is immediately apparent that the patterns of motor vehicle theft vary across the area. For example, the large pie is situated in the centre of Johannesburg just south of Joubert Park. This area has a high concentration of visitors as well as places of work. The clocks show high theft of motor vehicle activity between 08:00 and 16:00 with a peak either between 10:00 and 12:00 or 12:00 and 14:00. Towards the south, a more residential area, the crime activity peak moves towards the latter part of the day, after 16:00, with residents returning home after work in their vehicles.

Figure 2 shows day-of-the-week crime clocks for the same part of Johannesburg, using the same data set of a year's theft of motor vehicles. Each clock has seven segments, one for each day of the week, with Sunday and Monday at the top of the clock. Again, there are quite striking differences between the different areas – the centre of Johannesburg, shows a typical working weekday pattern and towards the west in the residential/commercial areas, there tends to be more criminal activity on a Saturday.

Both examples show that there is a far larger concentration of crime incidences in the Central Johannesburg area than the residential/commercial areas.



Figure 1: Theft of motor vehicles per two-hour time slot

Target performance maps

Target performance maps are *choropleth* (mosaic) maps that compare actual, normalised crime rates (e.g. number of crimes per 1000 of population) against realistic targets, to show the police's progress in combating crime. They provide a quick overview of where concentrations of crimes occur. By using data from a long period for selected priority crimes, analysing trends, we have adapted the *Cusum* method (used in quality

assurance), to give an early warning of significant deviations in quality (*i.e.* crime rates), from achievable targets for the priority crimes.

The *target performance maps* are created by comparing the mosaic maps (of actual, normalised crime data per CAS block), with the targets created using the *adapted Cusum* (general one-way cumulative sum) method.



Figure 2: Theft of motor vehicles per day of week

The *normalised* targets are calculated from historical data, showing the acceptable level of crime, under normal circumstances. Based on this, the *stretching* target is calculated. It is normally between 20 and 25 percent below the *normalised* target.

A weekly period gives a good indication of how crime is displaced within a police station precinct as a result of the targeted crime prevention in the CAS blocks, which were above the *normalised* target. If a pattern of displacement is detected, it may be possible to predict what “new” location criminals will move their activities to. Using this information, targeted crime prevention may trap criminals in their “new” areas.

For each crime type, a lower, *stretching* target, is identified. When achieved regularly, it signals a significant and sustained reduction in the level of that crime. The aim is to have *never-ending improvement* in the crime situation – once the targets are being met consistently, they can be revised downwards.

The crime rate for each CAS block is then compared against the targets for that specific CAS block: if worse than the normal target, the situation is considered to be *deteriorating* (shaded in black); if between the two targets, the area is considered *stabilizing* (shaded in grey); if better than the stretching target, the CAS block is considered *improving* (shaded in white).

Figure 3 shows a target performance map for the whole of the SAPS Area, assessing the rate of theft of motor vehicles over a one-week period.

Target performance maps are particularly useful for determining the impact of specific crime prevention interventions by the police. They could also be applied to monitor the effectiveness of other aspects of crime prevention, such as the recovery of firearms, vehicles or arrest rates.

DETERMINING PRIORITY AREAS FOR ESKOM'S DISTRIBUTION EXPANSION

Introduction

Eskom Distribution manages the low and medium voltage (LV/MV) electricity grid and is responsible for the sales to municipalities, industry, *etc.* It obtains electricity from Eskom Transmission, which is responsible for the high voltage grid. Eskom Distribution contracted the CSIR to develop a model to indicate areas that have the highest need for electrification based on several criteria.

Methodology

In consultation with Eskom staff it was decided to use eight criteria to determine priority areas. These criteria are:

- Backlog – areas where there is no LV/MV grid and non-urban areas;
- Integrated Spatial Rural Development Program (ISRDP) areas;
- Schools without electricity
- Clinics;
- Cost grids based on slopes, land use classification, roads and dams;
- Change in settlement areas;
- Human Intervention Areas (*e.g.* projects funded by aid agencies such as the Kellogg Foundation); and
- Concession areas – areas where alternative electricity is produced, such as solar energy and wind farms.

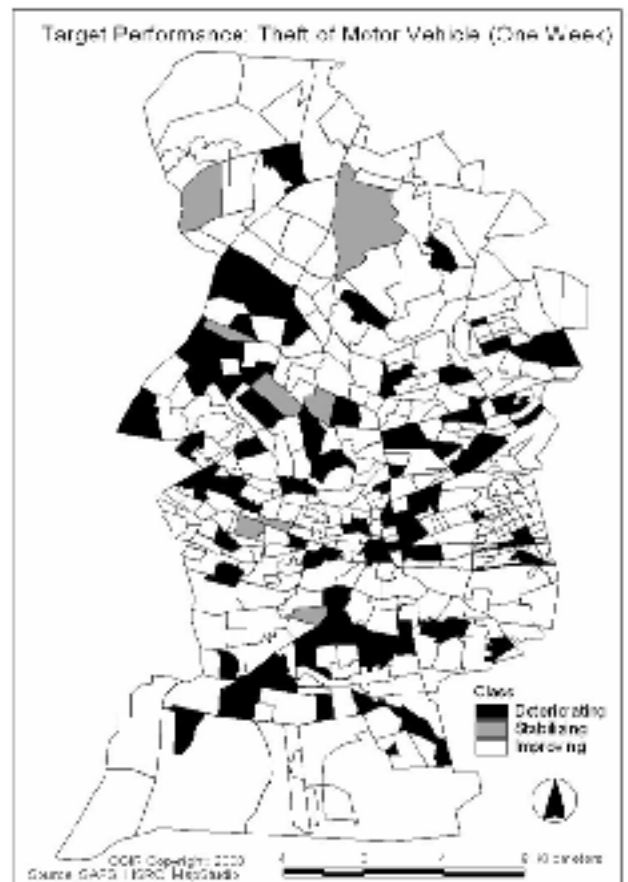


Figure 3: Target performance mapping for SAPS Area Johannesburg

The methodology followed is the Multi-Criteria Evaluation (MCE), methodology as discussed in Eastman, 2001. MCE combines the information from several criteria into a single index of evaluation. The result is a suitability map (S), which highlights areas of priority for the expansion of the grid. The formula for S is:

$$S = \sum w_i x_i$$

where:

S = suitability

w_i = weight factor for criterion i

x_i = score of criterion i

The score of a criterion is based on the importance of the criterion itself or the distance from a point of interest, e.g. the distance 200m to 500m away from the existing grid was scored 255, i.e. meaning it is not very expensive to expand the grid. The further away from the existing grid the more expensive it is to expand and the score becomes lower.

To enable the process (applying the formula) it is necessary to develop weights for each of the criteria in order to establish which criteria (mentioned above) are more important than others. Using the Delphi methodology, a questionnaire was distributed to domain experts to assign the criteria weights.

Once the suitability was calculated, the results were grouped into five classes: Very High, High, Medium, Low and Very Low. This was based on the value of suitability; the higher the value the higher the priority.

Figure 4 shows the map of South Africa with the 5 different priority classes for expanding the LV/MV grid.

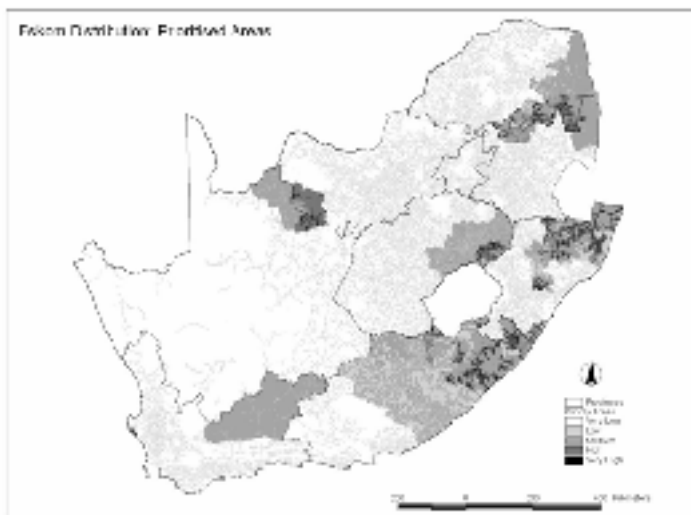


Figure 4: Priority areas for grid expansion in South Africa

ACKNOWLEDGEMENTS

We would like to acknowledge the financial support of the Innovation Fund of the South African Department of Arts, Culture, Science and Technology as well as Eskom. We would also like to acknowledge the contribution of our colleagues at the CSIR, Eskom and SAPS. ♦

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Operations Research Society of South Africa National Conference 2004 5-8 September 2004

Graduate School of Business, University of Stellenbosch, Bellville, Western Cape

FIRST NOTIFICATION AND CALL FOR PAPERS

The annual conference of the Operations Research Society of South Africa will take place from 5 - 8 September 2004 at the Graduate School of Business, University of Stellenbosch, Bellville near Cape Town. Participation over the full spectrum of Operations Research will be welcomed at the annual conference. All papers will be welcomed, whether they are of a more fundamental nature, about the application of OR in business or industry, about topical issues in OR or about education issues. Selected full papers of quality will be considered for publication in *ORiON*, the journal of ORSSA. This is an invitation to attend the conference and to submit a paper.

Abstracts

Those interested in participating in the conference should submit an abstract of not more than 300 words via the internet at the Society's website (www.orssa.org.za), or by e-mail or by ordinary mail to the program chair, Jan van Vuuren at vuuren@sun.ac.za. The abstract should include the title of the paper, the name(s) of the authors, their affiliation, and contact details (including e-mail address, telephone number and fax number) and the 300 word summary of the paper in plain text, with no mathematical expressions. Notification of acceptance will be given by e-mail by 31 July 2004.

Conference registration

A registration form, payment details, maps, etc will be available on the internet website of ORSSA in due course and will also be included in the next newsletter (due in July 2004). To register, the easiest would be to fill in the form on the ORSSA web pages. Else you may download the registration form from the website or use the paper copy in the July edition of the newsletter and post or fax it to the address below.

Conference venue

The conference will be held at Graduate School of Business, University of Stellenbosch at the Bellville Park Campus in Charl Cronje Drive, Bellville, Cape.

Accommodation is available at the Bellvista Lodge on the campus, or at a number of hotels in the vicinity of the Business

School. Details are provided below. Participants are responsible to make their own accommodation reservations. A number of rooms at the Bellvista Lodge have been pre-booked for the conference. If you were to make a booking at the Bellvista Lodge please indicate that this is for the ORSSA conference.

Provisional Programme Outline

5 September	17:00	Registration
	18:30	Welcoming function
6 September	08:00	Registration
	09:00	Sessions
	17:00	Annual General Meeting
7 September	09:00	Sessions
	19:00	Conference dinner
8 September	09:00	Sessions
	13:00	Conference closes, followed by lunch (included)

Conference fees

Will be announced in due course – watch the web pages of the society.

Important dates

- 23 July 2004:** Deadline for submission of abstracts
- 31 July 2004:** Notification of acceptance of papers
- 31 July 2004:** Deadline for early-bird registration
- 29 August 2004:** Deadline for conference registration



The following hotel accommodation is available

Hotel	Phone no. (021)	Fax no. (021)	E-mail	Single tariff / night	Breakfast
Bellvista Lodge (on Campus)	918 4444/5	918 4443	Bvista@usb.sun.ac.za	R360	R50
City Lodge (10 min walking)	948 7990	948 8895	tbell.resv@citylodge.co.za	R385	R52
Protea Hotel Tygervalley (2km by road)	913 2000	913 5444	res@phtygervalley.co.za	R455	(included)

Eerste kennisgewing en Oproep vir referate

Die jaarlikse konferensie van die Operasionele Navorsingsvereniging van Suid-Afrika vind plaas vanaf 5 tot 8 September 2004 by die Nagraadse Bestuurskool van die Universiteit van Stellenbosch in Charl Cronjerylaan, Bellville, Wes-Kaap. Die organiseerders wil deelname oor die volle spektrum van Operasionele Navorsing by die jaarlikse konferensie aanmoedig. Alle referate word verwelkom, hetsy dit van 'n meer fundamentele aard is, dit oor die toepassing van ON in die nywerheid of sakewêreld, aktuele onderwerpe in ON of opvoedkundige sake handel. Geselekteerde referate sal vir publikasie in *ORiON*, die tydskrif van ONSA oorweeg word. Hierdie skrywe is 'n uitnodiging om die konferensie by te woon en 'n referaat voor te berei.

Opsommings

Persone wat belang stel om aan die konferensie deel te neem, word genooi om 'n opsomming van hoogstens 300 woorde via die vereniging se webtuiste (www.orssa.org.za) in te dien, of om dit direk aan die programvoorsitter, Jan van Vuuren by vuuren@sun.ac.za te stuur. Die opsomming moet die volgende insluit: die titel van die referaat, die name van die outeurs, hulle affiliasies en kontakbesonderhede, insluitende e-posadresse, telefoon-nommers en faksnummers, en die 300 woord opsomming van die referaat in teksvorm, sonder enige wiskundige uitdrukkings of formules. Kennisgewing van aanvaarding sal per e-pos teen 31 Julie 2004 gegee word.

Registrasie vir die Konferensie

Registrasievorms, besonderhede vir betaling, kaarte, ens sal binnekort op die webtuiste van ONSA beskikbaar wees, asook by die nuusbrieff wat in Julie 2004 uitgestuur word, ingesluit word. Registrasievorms moet verkieslik direk op die webtuiste ingevul word, maar kan ook daarvandaan afgelaai word of die papierkopie in die volgende nuusbrieff kan gebruik word. Ingevalde registrasievorms kan aan die onderstaande adres gepos of gefaks word.

Konferensiefasiliteit

Die konferensie sal by die Nagraadse Bestuurskool van die Universiteit van Stellenbosch op die Bellvilleparkkampus, Charl Cronjerylaan, Bellville, Wes-Kaap gehou word.

Akkommodasie is op die kampus by die Bellvista Lodge

beskikbaar, asook by 'n aantal hotelle in die omgewing. Besonderhede word hieronder gegee. 'n Aantal kamers by die Bellvista Lodge is vir die konferensie vooruit bespreek. Indien u van verblyf by die Bellvista Lodge gebruik gaan maak, meld asseblief dat u vir die ONSA konferensie kom.

Voorlopige Program

5 September	17:00	Registrasie
	18:30	Verwelkomingsfunksie
6 September	08:00	Registrasie
	09:00	Sessies
	17:00	Algemene Jaarvergadering
7 September	09:00	Sessies
	19:00	Konferensiedinee
8 September	09:00	Sessies
	13:00	Konferensie sluit

Konferensietariewe

Konferensie tariewe sal mettertyd beskikbaar gestel word – hou die webtuiste dop.

Belangrike Datums

23 Julie 2004:	Sperdatum vir voorlegging van opsommings
31 Julie 2004:	Kennisgewing van aanvaarding van bydraes
31 Julie 2004:	Sperdatum vir vroeë registrasie
29 Augustus 2004:	Sperdatum vir finale registrasie

Kontak-besonderhede/ Contact details

Konferensievoorsitter: Wim Gevers
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Programvoorsitter: Jan van Vuuren
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Faks: 021 808 3778

ONSA webtuiste : www.orssa.org.za

Konferensie e-pos adres: orssa2004@belpark.sun.ac.za

Posadres :
ONSA Konferensie
Posbus 610
Bellville
7535



BOOKS REVIEW

By Hans Ittmann (*hittmann@csir.co.za*)



Military Operations Research – Quantitative Decision Making, N.K. Jaiswal, 1997 (third printing 2003). Kluwer Academic Publishers, Norwell, MA, USA, pp. 388.

Operations Research had its origins in the military environment – the name reflects that in no uncertain terms. Scientists were doing research into the operational problems of the generals on the different war fronts. Today, unless one is involved in military OR directly, the literature available on military OR in the more popular OR journals is limited. This is in no way a reflection on the quality and quantity of OR being practised in the military field. Therefore the book, **Military Operations Research**, although published initially in 1997, is a very opportune publication which exposes one to the wide variety of problems and issues addressed by those working in this area. One gets a feel for the richness of the work and also the complexity of problems being addressed. The subtitle is “quantitative decision making” and throughout all the topics covered the use of quantitative tools are very obvious.

Why is there such a need for OR in the military? One of the major reasons is the fact that countries spend enormous amounts of money on weapon systems and then it becomes imperative for the decision makers to assess the long term consequences of the acquisition plans. The following are some of the questions that need to be addressed:

- Can the threat to the country be quantified?;
- What are the chances of war between two countries?;
- What is the effectiveness of a weapon system or a tactical plan in a plausible combat scenario?;
- What force mix should be deployed for a specific mission?;
- Is the rule of thumb of 3:1 force ratio for an attacker to achieve success against a defender valid?; and
- Can the training of officers through field exercises be augmented by simulated combat exercises in the laboratory?

These questions create challenging problems for those supporting decision makers including the commanders on the battlefield. In addition the weaponry that is currently being used by military forces all over the world, are much more lethal, contain very advanced technology and through high-tech computerization provide comprehensive decision aid to all levels of command. Effective C⁴I (command, control, communication, computers and intelligence) has become essential and vital for military decision making. Military OR is thus aimed at these problems and can be defined as “a scientific method of

providing defence departments with a quantitative basis for decisions regarding the operations under their control”.

The methodology used by OR analysts in the defence environment is basically the same as what OR people use in general. The methodology entails the familiar steps of problem formulation, model development, data collection, model solution, model validation and implementation. Aspects that need to be considered to ensure success in a military study are: the composition of the team, data availability (always a problem and here as well!), mutual understanding between the analyst and the decision maker, and the duration of an OR study.

There are twelve chapters in this book and after the first introductory chapter; each chapter is devoted to a specific topic. Search, detection and damage assessment are some of the basic military operations and these are covered in chapter two. In a war situation a target needs to be searched and if detected it needs to be “acquired.” Then its movement is tracked, efforts are made to recognize and identify the target. The next step is to engage the target and to attack it. Finally the damage is assessed. Many models and theory have been developed to assist in this. Various theories and models have been developed for detection, there is a whole theory around search, various hit probabilities can be computed, damage assessment can be determined, etc. and all these are described in this section. These models and theories are all very mathematical while it is very noticeable here, and throughout the book, that a unique language, in terms of terminology and nomenclature, exists for military OR!

Simulation of complex military systems is a very common phenomenon. Due to this complexity it is impossible to experiment on the system and therefore people revert to simulation. Various such approaches are described. These can be discrete or continuous while simulations of systems at different levels are outlined. Military simulations can be classified into different categories namely a weapon or sensor system, single platform task group, mission analysis and theatre level. A whole range of simulation packages used for different applications are listed.

A closely related topic to simulation in the military OR context is war gaming. A short history of war games is presented with a fairly comprehensive outline of how to develop a war game. War games can be used for training and planning purposes, while they can also be used to research concepts and doctrines. Different types of war games for the different branches of a defence force are described. (This chapter brought back many happy memories – some 30 years ago Project Sening was the war gaming effort run by CSIR for the then South African Defence Force!)

The selection of a weapon system depends on its effectiveness and cost. The evaluation of the effectiveness is a non-trivial exercise since it depends on a number of factors that affect the performance of the system. Different approaches to calculating effectiveness are covered while a Measure of Effectiveness (MOE) is defined. A number of fallacies in conducting cost effectiveness analyses are



pointed out which is very useful.

Within military OR optimisation problems abound and a whole chapter is devoted to these. The optimum use of resources to achieve a specific objective under different constraints forms an important class of problems. Examples of problems are presented that cover all the classical OR techniques namely linear programming; transportation problems; integer, dynamic, non-linear and multi-objective programming; etc.

Three heuristic optimisation techniques are presented in chapter 7. The theory, or methodology, of each of these heuristics is covered in a lot of detail and through an example from the military environment it is illustrated how one would use each of these three techniques. The advantages and disadvantages of the different heuristics are summarized at the end of the chapter.

Problems in the defence environment typically have multiple criteria and therefore military OR needs to deal with multi criteria decision making problems as well. Many of these problems have to be resolved by using the judgement of experts and therefore techniques such as the Delphi method, Decision Matrix approach, Forced Decision Matrix Approach and the Analytic Hierarchy Process (AHP) are discussed. An extended example is used to illustrate the AHP approach and process.

Two chapters are devoted to combat models, the one focussing on homogeneous models and the other on heterogeneous models. In the afore-mentioned case two forces are considered both having identical weapons although not of the same type. In reality, however, one will find that each combat side will have different types of weapons i.e. Infantry, artillery, etc. In this case the combat model is referred to as a heterogeneous combat model. Combat models endeavour to explain the dynamics of combat through mathematical models. One of the most well known models is the Lanchester equations of warfare which is a set of differential equations that describes, in essence, the attrition rates of the combatants. Fairly involved models have been developed and they are presented. Measures of combat success are presented as well as combat modelling with spatial effects, stochastic duels and stochastic combat models. The heterogeneous models deal with more weapon types and the developments have advanced to the point where optimisation models for these types of situations exist. Detailed descriptions of these are presented.

Every nation has to guard against threats from other countries. These threats can be in the form of direct military attacks, covert disruptive activities and propaganda against the government. The quantification of the military threat is a major problem that concerns the top decision makers of a country. Threats can be quantified by considering the weapons, equipment and manpower of the threatening country. Having quantified the threat, strategies can be developed to counter these and this can be done within the framework of the military doctrine of the country. Both static and dynamic analyses approaches to threat assessment are described in the penultimate chapter.

The final chapter considers the analysis of strategic stability

issues. Here one is considering the stability of a region that comprises of a group of countries. Stability is achieved if there are no hostile intentions from another region. The chapter focus on the analyses of the influence of conventional military forces on a system consisting of a number of parties.

Military OR is a vast area and covers many aspects; this is very clear when one reads **Military Operations Research**. The approach throughout the book is very strongly mathematical. It will therefore take real effort for anyone not familiar with Military OR, to work himself/herself into this field. If there is one criticism towards this book it is the strong American influence. Although one has to admit that the US defence is very strong, influential and that they sponsor a lot of the military OR work, it is still a pity that not much was taken from other countries. However, for anyone involved in and practising military OR, this book is a must. ♦

Kluwer has sponsored a copy of the Military Operations Research – Quantitative Decision Making. This copy can be won by an ORSSA member that answers the following question correctly.

What is the uses of war gaming in the military OR context?

The winner will be randomly selected from the correct entries. Please e-mail your answer and contact details to the editor at ldtome@dip.sun.ac.za. The winner will be announced in the June issue.

You can also receive a free copy of any OR related book published by Kluwer by reviewing the book. For more information please contact the editor.

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www.wkap.nl



Operations Research 2005 (OR 2005)
International Conference on Operations Research

September 7 - 9, 2005
University of Bremen, Bremen, Germany

Contact: Prof. Dr. H.-D. Haasis, haasis@uni-bremen.de
Prof. Dr. H. Kopfer, kopfer@uni-bremen.de



CHAPTER CALENDER

Vaaldriehoek Chapter

Fryday February 20th, 2004 from 13:00-17:00

Topic: Plant visit to SA Breweries

Venue: SA Breweries plant, Alrode

Wednesday May 19th, 2004 from 16:00-18:00

Speaker: Wayne Steel (Sasol Polymers)

Topic: The use of Advanced Planning in the optimisation of supply chains: a Sasol Polymers case study

Venue: Personnel Auditorium, Block H, Sasol, Sasolburg

Wednesday August 18th, 2004 from 16:00-18:00

Speaker: Sarie Duvenhage (Vaal University of Technology)

Topic: Optimisation for nutritive value and affordability in a plant-based product using linear programming

Venue: Personnel Auditorium, Block H, Sasol, Sasolburg

Wednesday October 13th, 2004 from 16:00-18:00

Speaker: Robbin Hendry, AECI

Topic: Enterprise Risk Management

Venue: Personnel Auditorium, Block H, Sasol, Sasolburg

Refreshments are served at all events to allow for extensive networking

Western Cape Chapter

Wednesday March 17th, 2004 at 16:00

Speaker: Nancy Brown (PIC Solutions)

Topic: Provision Forecasting: Impact of Seasonal Trends

Venue: Room 215 of the Main Building, US Graduate School of Business, Bellville The chapter AGM and a welcoming cocktail reception will be held after the seminar

Wednesday May 5th, 2004 at 16:00

Speaker: Goran Dragosavac (SAS)

Topic: Datamining and its application

Venue: Seminar Room, Department of Statistical Sciences (Building 28, PD Hahn), University of Cape Town

Wednesday June 2nd, 2004 at 16:00

Speaker: Arabinda Tripathy (Indian Institute of Management)

Topic: Soft Problems, Hard Impats: Can OR Help!

Venue: Seminar Room, Department of Statistical Sciences (Building 28, PD Hahn), University of Cape Town

Wednesday July 28th, 2004 at 16:00

Speaker: Margarete Louw (Dept of Applied Mathematics, US and PIC Solutions)

Topic: Design of an automated DSS for scheduling tasks in a generalised jobshop

Venue: Room A409, Department of Applied Mathematics, Main Engineering Building, University of Stellenbosch

Wednesday August 25th, 2004 at 16:00

Speaker: David Coleman (Dept of Applied Mathematics, US and PIC Solutions)

Topic: Scheduling a general jobshop using computer simulation and neural networks

Venue: Room A409, Department of Applied Mathematics, Main Engineering Building, University of Stellenbosch

Wednesday October 13th, 2004 at 16:00

Speaker: Elmari Roos (Gamma Solutions Bk)

Topic: A Taguchi application in experimental planning

Venue: Room 215 of the Main Building, US Graduate School of Business, Bellville

Wednesday November 17th, 2004 at 16:00

Competition for the Best Student Year Project

Speakers & Topics: To be announced

Venue: Room 215 of the Main Building, US Graduate School of Business, Bellville

Johannesburg Chapter

Here's the broad calendar for the rest of the year – this is as much detail as we've got so far:

Mid May, after the Easter school holidays:

a Schools Day, where we introduce grade 11 and 12 school children to what OR is, and what a career in OR will be like.

May/June: a technically focused meeting for members

July/Aug: a technically focused meeting for members

November: a technically focused meeting for members, including the AGM and a cocktail party.

We have another marketing idea up our sleeve, but I won't mention it until it is a bit better defined.

CHAPTER NEWS

Johannesburg Chapter Chairman's Report: November 2003

The Chapter has had another relatively quiet year. The year started with a talk at the previous AGM entitled "OR in Banking," given by Pramod Mohanlal of ABSA and Paul Fatti of Wits University (and the Chapter Vice-Chairman). They discussed the role of OR and Statistics as strategic tools for providing competitive advantage in banking, with some examples of actual applications.

The "Gauteng" annual dinner was a Valentine's Day event this year, arranged by the Pretoria Chapter and supported by several Johannesburg couples. Full marks and thanks to the Pretoria Chapter for a very pleasant evening with excellent speakers (Dewald Roode, on his early days in OR, and Hans Ittmann with a general review of goings on in ORSSA at National level). The function was marred only by the minor inconvenience of what sounded like a herd of elephants moving furniture immediately above our heads for large parts



of the evening.

Committee member Neil Manson is on the faculty of the Roodepoort campus of Monash University and arranged a seminar in March presented by Ann Nicholson, visiting from their Australian parent university, on Knowledge Engineering for Bayesian Networks. The Monash campus also hosted the seminar, attended by some 15 Society and University members, and also provided refreshments. Many thanks to Neil and Monash for a very interesting and enjoyable evening.

Another schools afternoon was held in September, introducing Grade 11 pupils to the possibilities of OR as a career for anyone interested in maths and science. As last year, it was attended by a relatively small number of students and teachers – some 20 or so, who found it very stimulating. We have now run this for two years and got very positive feedback; we must put more effort into holding it at a time of year when more schools will attend. Particular thanks go to Derek Saunderson, who did the organising, and Paul Fatti, who shouldered a large part of the presenter's burden.

I would like to extend my thanks to my committee: Paul Fatti (vice-chairman) Stephen Sharpe (secretary) Derek Saunderson (treasurer), Neil Manson, Jeff Tyler and, initially, Rory Hunkin, who is currently working full time in Ireland, and has tendered his resignation. ♦

Johannesburg AGM

The Johannesburg Chapter AGM was held at Hofmeyr House on the Wits campus on Thursday 20th November 2003. Approximately a dozen people attended a talk by Robin Hendry on modern risk management. He gave a very interesting talk on how risk management is so crucial in the modern business world, and how it is used to lower the cost of debt and equity and increase expected cash flows and shareholder value by reducing volatility. He covered the three major risk types: market risk (e.g. exchange rate fluctuations), credit risk (e.g. borrowers defaulting) and operational risk (e.g. your computer centre burning down.) The techniques used are a key element of modern corporate financial management, and are very close to OR and statistics, and involve simulation of future cash flow scenarios, for example. The talk clearly struck a chord with the audience, as what Robin had intended to be a 30 minute talk went on for over an hour, because of the interruptions and discussions, and when the cocktail party after the AGM got underway, it was still the main topic of conversation.

At the AGM, Dave Evans was re-elected chairman, Derek Saunderson was re-elected Treasurer and Stephen Sharpe was re-elected as Secretary. Paul Fatti asked to step down from the vice-chairman position, after many years of sterling service, and Neil Manson was elected to that post. ♦

Highveld annual dinner

The annual highveld social event was a dinner organised by the Johannesburg chapter at Da Vincenzo's restaurant in Midrand on Friday 13th February – an ominous portent? Despite the

date, some two dozen members and friends enjoyed an extremely nice meal and the convivial company for which these dinners are now very well known, although we did get very wet getting across the car park. Lots of old friendships were refreshed, with comments to the effect of "We must see you again this time before another year passes," as we parted company at the end of the evening.

The speaker was Johannesburg Chapter Chairman and past President, Dave Evans, who talked light-heartedly about his experiences in OR over a career which now stretches to some 35 years. He recounted some of the more obscure projects he had been involved in, such as simulating the metabolism of a dog, and trying to predict insurgent infiltration routes in what was then Rhodesia, as well as discussing what makes for successful OR projects, which is as often the buy in from management and the politics, as it is the elegance of the maths. In this sense, he was very deliberately building on the similar message of Dewalde Roode's at the similar event a year previously. Just having any model which allows you to see the consequences of assumptions and try different scenarios, is often worth its weight in gold. He did, however, give several examples of where the "hard" OR had also been very successful. The really key question to always ask yourself as a practitioner is "Did I make a difference which helped to get a better outcome?" As to how you define "better" ... – perhaps we leave the client to answer that! ♦



EURO Summer and Winter Institutes

The series of EURO Summer and Winter Institutes (ESWIs) was launched in 1984 at the initiative of J.P. Brans. Scarcely any other EURO instrument has had such impact upon future generations of OR people. Each ESWI, organized by a national society, focuses upon a particular subject.

The basic idea is that around 20 young (approximately between 25 and 35 years of age) researchers all having an unpublished paper within the theme announced, can meet for about two weeks, present their material, discuss it with others and with a handful of specially invited senior experts in the field, and finally prepare a paper to be considered for inclusion in a feature issue of EJOR. Three ESWIs may be approved in any two year period.

Disregarding the senior experts, no one else can participate more than once in his or her lifetime. Participation in an ESWI should be regarded as a considerable honour. In other words, the main objective of an ESWI is to give a limited number of carefully selected representatives of the next generation a unique opportunity for establishing a personal network and for addressing an international audience and thus to create new research groups around the topic chosen.

For more information go visit :

www.euro-online.org/display.php?page=institutes&



A WEEK OF THRILLING OR IN ATLANTA

by Jan van Vuuren (Vuuren@sun.ac.za)

As part of my sabbatical leave I had the opportunity to visit Anton Kleywegt at the School of Systems and Industrial Engineering at the Georgia Institute of Technology (Georgia Tech) in Atlanta, Georgia during October 2003. During the single week of Wednesday October 15th to Wednesday October 22nd I was fortunate to participate in three excellent OR meetings organized by the School of Systems and Industrial Engineering and others in Atlanta. This exciting week kicked off with the biennial Georgia Tech Supply Chain Executive Forum during 15-16 October at the newly built Georgia Tech Hotel. This was a meeting of CEOs and CFOs of a number of large companies in the Atlanta area and further afield, who have close ties with faculty members at Georgia Tech, either through past training or via collaborative research and consulting work. This was followed up with a Mini Conference on Asia-Pacific Logistics on Saturday October 18th at the Georgia Tech Global Learning Center. This meeting was jointly organised by the Logistics Institute at Georgia Tech and the Asia Pacific Logistics Institute (based in Singapore), and consisted of a number of key-note addresses on logistics supply chain challenges and achievements in the Asia Pacific region. The final meeting of the week was the annual INFORMS (American Operations Research Society) meeting, held during 19-22 October at the Westin Peachtree Plaza in downtown Atlanta.

Georgia Tech Supply Chain Executive Forum, October 15-16, 2003

The biennial Georgia Tech Supply Chain Executive Forum creates a regular opportunity for CEOs of large companies to meet with each other and with experts in supply chain management and modelling from Georgia Tech so as to exchange ideas on the efficient structuring and organization of supply chains. About 30 faculty members from the School of Systems and Industrial Engineering at Georgia Tech and CEOs and logistics vice-presidents of companies such as the Home Depot, Logistics Limited, United Parcel Service, the United States Post Office, SVP Global Logistics and the SVP Supply Chain Group attended the Fall-2003 meeting. The meeting spanned two days and consisted of a number of keynote addresses as well as a “big dig” (a breakaway session of interactive group discussions). Rick Jackson (senior vice-president of Limited Logistics) gave the first keynote address and spoke about what the CEO of a large company expects from logistics and supply chain management. This was followed by a “progressive dinner” at which delegates changed tables in between meal courses in a kind of *musical chairs*, and discussed pre-formulated logistics hot topics. After a buffet breakfast the next morning, Roger Kallock (CEO of Chagrin Consulting Associates and former US undersecretary of defence for logistics) delivered the second keynote address

and made the case that resilient supply chains are a CEO’s best defense against unforeseen logistics problems. This was followed by the “big dig,” chaired by a panel consisting of Wayne Gibson (SVP Global Logistics and the Home Depot), Greg Easterlin (CIO & VP Supply Chain Management) and Joe Payne (SVP Supply Chain Group). I could see that the CEOs were eager to share their knowledge and experience, and to get advice from their peers and the Georgia Tech staff with respect to the intricacies of the difficult topic of supply chain management. After the “big dig” report back session Kevin Hendrix (University of Western Ontario, Canada) delivered the last keynote address and spoke about supply chain glitches. I came away from this meeting with an appreciation for the role that such an executive forum can play, to the benefit of both industry and academia. And I wished that we had a similar platform in South Africa! This made me realize that ORSSA seems to be the ideal vehicle for such a forum in South Africa, if only a larger number of industry members could be enticed to attend ORSSA meetings...

Mini-Conference on Asia-Pacific Logistics, October 18, 2003

This mini-conference on logistics issues in the Asia-Pacific region consisted of four keynote presentations, which lasted from 10:00 to 15:00, with a break for (a delicious) lunch in between. The first speaker was Beat Schweizer of Cendian, who gave an overview of the scale and nature of operations by the company Cendian in the Asia-Pacific region. This was followed by a talk by Steven Kretch on the transportation logistics operated by Stolt Nielsen from and to the far east. After lunch Chuck Doherty gave a fascinating presentation on the integrated logistics chain of United Parcel Service (who were also the main sponsors of the INFORMS meeting) around the world, and in the far east, in particular. I was called upon to give the last presentation on a project involving the study of export infrastructure capacities in the South African fresh fruit industry, which is coordinated by Esbeth van Dyk (Transportek, CSIR) and in which Frank Ortmann (a masters student of mine) and I participated with many other academics, students and role players in industry. I gave this presentation instead of the planned talk by Cesar Berenguer of Manhattan Associates, who was ill, and could not make it.

Annual INFORMS meeting, October 19-22, 2003

This was my first INFORMS conference and I was stunned by the scale of the meeting. At any one time there were between 40 and 50 parallel streams of technical sessions, consisting of contributed and sponsored paper clusters, on diverse topics including derivative pricing models, stochastic network applications, optimization theory and applications, supply chain management, portfolio decision analysis, data mining, network design, scheduling and routing problems, data envelopment analysis, war gaming & game theory, health care modelling, applications of vulnerability and reliability theory, warehousing and inventory theory, queuing theory, behavioural decision making and models in sports & music, to name but a few! Each



day consisted of four slots of parallel technical sessions, interspersed with plenary and key-note addresses, tutorials, software demonstrations, as well as lunch and coffee breaks. There were a total of 8 plenary addresses by distinguished speakers, such as Edward Kaplan (Yale School of Management), Judith Liebman (who delivered the annual Omega Rho distinguished lecture), Rob Ritchie (president and CEO of Canadian Pacific Highway, and recipient of the coveted 2003 Franz Edelman prize), James Holsen (vice-president of engineering at United Parcel Service) and Jan Karel Lenstra (editor-in-chief of *Operations Research Letters*). There were also more than 40 software and OR related publications exhibitions at the conference.

I attended a number of valuable and informing presentations during the technical sessions. Amongst these my favourites were probably “Efficient algorithms for the multi-commodity flow problem with holding costs and extensions” by Lisa Fleischer (Carnegie Mellon), “Workforce scheduling with employee preferences” by Yong Yue Li (University of Alberta, Edmonton), “A mathematical programming model for electric power capacity expansion” by Takayuki Shiina (Central Research Institute of the Electric Power Industry, Japan), “Heuristic methods for the delayed, constrained least cost routing problem” by Zhanfeng Jia (University of California, Berkeley) and the tongue-in-the-cheek presentation entitled “Marriage, truthfulness and stability” by Mohammad Mahdian (MIT). There was truly something for everyone’s taste at the INFORMS meeting, if one could just cope with the overwhelming supply of interesting topics on offer. ♦

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A TRIP DOWN MEMORY LANE

From the archives: ORSSA Newsletters 1968 -1977

by Ilze du Plooy (ORSSA archivist)

The first document that I have in the newsletter file is “News and Views” of the Johannesburg OR group, November 1968. This was before the birth of the society in November 1969 and what appears is that there was a group of men, dedicated to the discipline and working for the promotion of Operations Research in South Africa. They formed Special Interest Groups (SIG) to work together on their special interests and problems. Once a month all came together for a discussion. SIGs were Cybernetics, Dynamic Programming, Econometric models, Simulation, Statistical Quality Control, OR in the Construction Industry and Forecasting. And they did things in an interesting way. A real problem at African Wire Ropes was presented to a panel of four, who were required to find a solution during the meeting.

After the formation of the society, a Bulletin was published and the first one contained the following note: “In addition to giving notice of meetings, it is the purpose of the Bulletin to publish your letters, news and papers. Contributions will be published in the language in which they are submitted. Please address them to the Editor at the Operations Research Society of South Africa address. Only one copy is required.”

The Johannesburg group became the first chapter to publish news and I could not resist the following:

“Mr Trevor Winer delivered a fascinating talk on the subject of an incentive scheme for Rave’s salesmen. Most OR effort seems to concentrate on optimising the performance of physical systems –e.g. production, distribution, etc. But here, for a refreshing change, was a study of human reaction to changes in the parameters of a model controlling the incentives of salesmen. This glimpse into the performance of a model based more on behavioural science than on the physical sciences was made all the more enjoyable by Mr Winer’s liberal sprinkling of comments on human motivation, as well as some interesting observations about the operation of Rave Stores – one of the most amazing stories of present day South African business.”

The July 1970 Bulletin had this to say about circulation:

The Bulletin is currently sent to about 300 people on a mailing list which was started before the formation of the Johannesburg OR Group. However from August, it will only be posted to those who have completed application forms and paid their annual subscription of R4-00.”

In October 1970 it is reported that the society has 62 full and 43 associate members.

The March 1971 issue of the bulletin included the talk given by Dr D Hawkins “The marriage problem and its marketing analogy” and I give you only the introduction. (Interested bachelors can contact me for a copy of the paper.)

“A bachelor decides to marry. He approaches a marriage bureau, which supplies N prospective brides (hereinafter referred to as birds) from which to select. All are unknown to him, and are selected at random from some population of birds...”

In June 1971 the name changed from Bulletin to Newsletter.

In July 1972 it is reported that there is interest to establish a Cape Town chapter. Notice is given of the first meeting at which Prof Tusenius of the Business School at Stellenbosch gave a talk, dealing with Operations Research in Business.

In April 1973 it is mentioned that the society became an affiliate member of the Joint Council of Scientific Societies.

In the same issue, from the gossip column, the following (verbatim):

Regular attenders at recent OR meetings have been mystified by the action of a well-known boffin who seemingly deserts the cause of OR to engage in a somewhat unusual pursuit. This new-found interest appears to be the practical analysis of electrical equipment and it has been rumoured that, based on his observations, a new OR technique is soon to be launched! It is understood that this technique will have its debut in a paper to be read to the society entitled: "The phenomenon of random discontinuity in polyphase sinusoidal networks."

From the editorial notes (October 1973): "For those who are interested in the ever-present debate within the Society regarding OR as a profession, a recent editorial comment in the New Scientist (28 June 1973), entitled "New professions v. the charlatans" may be of interest. While neither the editor, nor in particular the executive committee, necessarily endorse or reject the opinions expressed in this article, the final paragraph is perhaps worthy of consideration: "Perhaps as a craft matures, its practitioners need protection against the very dynamism and change they characterised when young, and thus a move toward protection is inevitable. But professionalism may turn out to be a poor straw to grasp for."

From a case study "A novena to St Jude", presented in the July 1974 issue:.....In the early days OR groups were always bought en bloc, because the guy they left behind might be the one who knew what he was doing..."

Some good advice in the next issue: "If the cost of collecting the data for a model is greater than the amount you can save by solving it, you shouldn't do that."

In 1976 the newsletter changed its format from A4 to A5, was printed on orange paper and carried a guest editorial. The first book review appeared in the May 1976 issue. With the new format came a new atmosphere. Gone were the entertaining and often tongue-in-cheek remarks and the little personal notices. The newsletter became more formal. Everything was very serious and at times the members were even reprimanded for not attending meetings and not paying membership fees instantaneously.

From a letter by a member published in the October 1976 issue:

"I feel that one of the major strengths of OR work is the emphasis on looking at a problem over a wide front either through a multidiscipline team or by an individual applying as wide a range of knowledge as possible. It appears to me that there is a tendency for OR to become mainly concerned with techniques and I feel that there is a growing gap between academics and

people in practice." Thus, the author suggested, there should be two grades of membership as well as a code of ethics.

The following year continued much in the same vein, but tried for something less serious in the November 1977 issue. The "Ten natural laws of Operations Analysis" by Bob Bedow was published albeit with the following admonition: "Readers might find them amusing although upon reflection to contain an element of truth." (The first one was: Ignore the problem and go immediately to the solution, that is where the profit lies.) ♦

One of the listed benefits of being a student member of ORSSA, is that students may request that abbreviated versions of their CV's be published in the newsletter, if they have graduated and are about to enter the job market. Please contact the newsletter editor at ldtome@dip.sun.ac.za if you are a student who fits this profile and if you wish to have your CV published.

Curriculum Vitae: Jacques van der Westhuizen

I am currently seeking an OR related position.

Personal Information:

Name: Jacques van der Westhuizen
Contact address: 15 Colosseum
 C/o Chopin & Delius Street
 S W 5
 Vanderbijlpark
 1911

Telephone: 082 580 6069
 (H) 016 932 2503
E-Mail: baas@webmail.co.za

Education:

TERTIARY EDUCATION	POTCHEFSTROOM UNIVERSITY for CHO
2003	B.Sc Stats & Business Management
2004	B.Sc Stats (HONNOURS)

Computer Skills:

- MS Office
- Arena
- Matlab

Reference:

Dr Pieter Moller PU vir CHO (016) 910-3501	Jan v.d. Linde Nampak Vanderbijlpark Manager (016) 950-3000
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MAXIMISING VOLVO'S CAMPAIGN ROI THROUGH MARKETING INTELLIGENCE

The challenge was to maximise Volvo Car Germany's return on a promotional campaign that would attempt to rekindle Volvo as a premium brand to existing and potential customers. The solution – from SAS Institute – incorporated data mining, forecasting, quality improvement and statistical analysis.

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Volvo Car Germany found that marketing alone did not support the company's sales growth targets. And using the marketing budget effectively was also a challenge.

Volvo wanted to grow its sales volumes by 50% and, to achieve this, decided to embark on a relationship marketing exercise by implementing a solution to support processes that would identify, attract, acquire and retain customers.

Volvo also wanted to increase the effectiveness of its relationship marketing budget and to communicate with customers in the customers' preferred way. This would entail having access to correct, complete and relevant customer information for all contact-points; making use of modern IT; and improving response efficiency, flexibility and completeness of all communication focused on the individual customer.

In addition, changes in the automotive environment influence the customer experience, which in turn is influenced by technological development, changing consumer behaviour, and the effectiveness of communication – all of these have to be taken into account in setting new Volvo marketing objectives.

Enter SAS Analytic Intelligence, which ensures that organisations are able to make the best use of information at hand, thereby providing them with the insight that drives business intelligence to the enterprise.

The power of SAS Analytic Intelligence allowed Volvo to go a long way to achieving its vision of being the most desired, progressive, premium brand globally.

Volvo Car Germany found that investing in addresses and data mining has maximised returns, and marketing intelligence results showed that data mining improved the response percentage by 12%.

In addition, the data source had a major impact on response rates – which Volvo found was marginally better – based on respondents' profiles versus actual customers.

The next phase of the exercise was for Volvo to monitor trends, explain known outcomes, predict future outcomes and identify factors that could secure a desired effect – all of this conducted using SAS Enterprise Miner.

Once again, SAS Analytic Intelligence provided Volvo with a means to monitor and measure its campaign performance; increase profitability of marketing campaigns; and control communications processes in-house.

SAS Enterprise Miner collects demographic data and customer buying pattern information. The collated information ensured that Volvo increased its revenue streams, decreased costs and enhanced its competitive position.

With the successful use of relationship marketing and improved data mining, the next phase for Volvo was to extend the use of the system within Volvo Car Germany and eventually complete rollout within Volvo Car Corporation globally.

This was complemented by the implementation of a central data mining system, which has allowed all data to be collated in-house. The spin-off of this is an integrated learning process for future campaigns, integrated communication and improved cross-selling opportunities.

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